Agilent 4339B High Resistance Meter

User's Guide

Agilent Technologies

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Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific *WARNINGS* elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.
The Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

Note

4339B is designed for use in INSTALLATION CATEGORY II according to IEC 61010-1 and POLLUTION DEGREE 1 according to IEC 61010-1 and IEC 60664-1. 4339B is an INDOOR USE product.

Note

LEDs in 4339B are Class 1 in accordance with IEC60825-1.
CLASS 1 LED PRODUCT

Ground The Instrument

To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.

DO NOT Operate In An Explosive Atmosphere

Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Keep Away From Live Circuits

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT Service Or Adjust Alone

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT Substitute Parts Or Modify Instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Dangerous Procedure Warnings

Warnings , such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

Warning

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting this instrument.

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility, or to the calibration facilities of other International Standards Organization members.

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of one year from the date of shipment, except that in the case of certain components listed in *General Information* of this manual, the warranty shall be for the specified period. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instruction when property installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

Limitation Of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

No other warranty is expressed or implied. Agilent Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Agilent Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

For any assistance, contact your nearest Agilent Technologies Sales and Service Office. Addresses are provided at the back of this manual.

Safety Symbols

General definitions of safety symbols used on equipment or in manuals are listed below.

Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual.

Alternating current.

Direct current.

On (Supply).

Off (Supply).

Warning

This **Warning** sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

Caution

This **Caution** sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

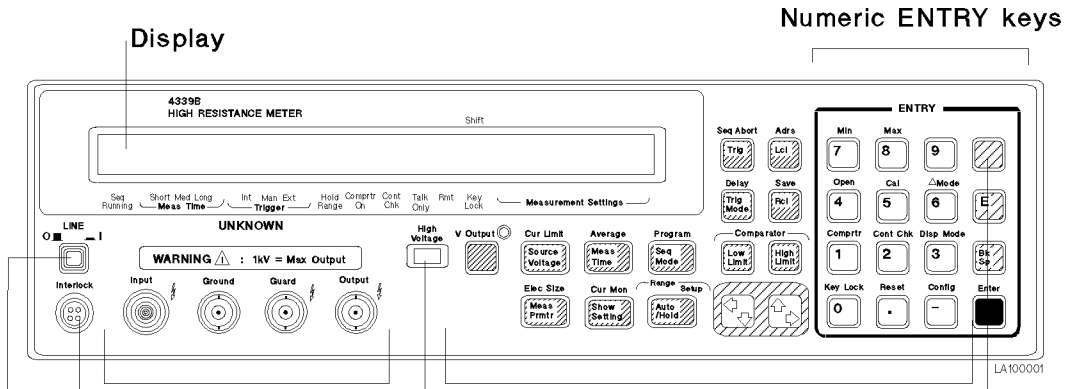
Note

Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

Affixed to product containing static sensitive devices use anti-static handling procedures to prevent electrostatic discharge damage to component.

Caution, risk of electric shock : Terminals which may be supplied from the interior of the equipment at a voltage exceeding 1 kV, or allow connection to a voltage exceeding 1 kV are marked with this symbol.

4339B High Resistance Meter at a Glance.

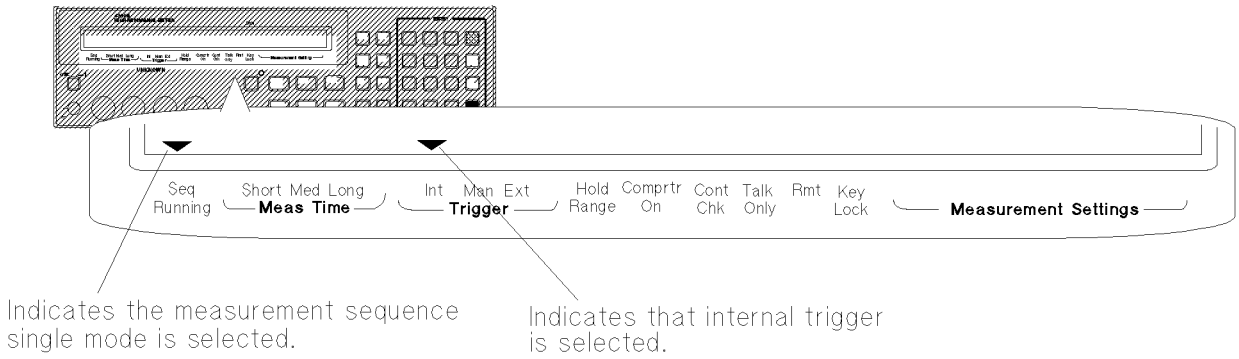


(In this book, the BLUE shift key is expressed as blue)

Warning **Do *not* touch the UNKNOWN terminals or the electrodes of the accessory, when the High Voltage indicator is ON.**

Annunciator(▼ symbols, at the bottom of the display)

Shows the instrument's operational state. For example,



LA100003

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- Chapter 1, Preparation for Use

  For initial turn on of the 4339B

- Chapter 2, Operating the 4339B

  Basic measurement operation

  Getting acquainted with the 4339B—for beginners
  Handy reference for common measurement tasks—for all users

- Chapter 3, Measurement Examples

  Measurement Examples for typical 4339B applications

  Measuring Insulation Resistance of a Capacitor
  Measuring Volume Resistivity of a Insulation Material

In the User's Guide, information on the following subjects is not discussed:

- Initial Inspection
- GPIB remote control
- Using with Handler
- Maintenance
- Specifications
- Error Messages

For detailed information on these subjects, see the *4339B Operation Manual*.

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1

Preparation for Use

In This Chapter

Before turning the 4339B ON, you must first set the 4339B to match the available power LINE voltage.

If the 4339B's power LINE voltage and frequency are properly set and ready to use, you can skip this chapter.

Power Requirements

The 4339B's power source requirements are as follows:

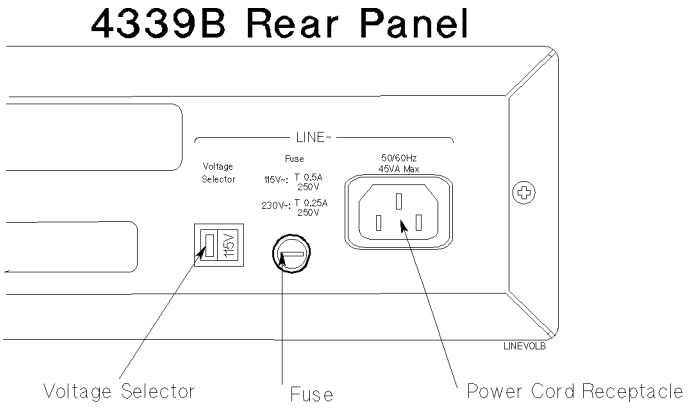
LINE Voltage : 100 / 120 / 220 / 240 V ac (±10%)
LINE Frequency : 47 to 66 Hz
Power Consumption : 45 VA maximum

To Set Power LINE Voltage

1. Confirm that the power cable is disconnected.
2. Slide the LINE Voltage selector on the rear panel to match the power LINE voltage which will be used (see Table 1-1).

Table 1-1. Power Voltage Selector Setting

Voltage Selector	Line Voltage	Required Fuse
	100V/120Vac(±10%)	UL/CSA type, Time delay 0.5A 250V (Agilent part number 2110-0202)
	220V/240Vac(±10%)	UL/CSA type, Time delay 0.25A 250V (Agilent part number 2110-0201)



To Set Power LINE Frequency

1. Connect the power cable to the power cord receptacle on the rear panel.
2. Push the LINE switch in. The 4339B will emit a beep and perform the self test. (If any message is displayed, see "Error Messages" back of *4339B Operation Manual*.) The 4339B will be ready for operation after a message like the following is displayed.

LA001005

```
HP 4339B   Rev.  xx.xx
           Dec. 13 1995
```

3. Press blue Config (−). The following menu is displayed.

LA001034

```
R:  +0.0000    Ω                          Vout:   0.000 V
Offset   Beep   Exit    more              Clmt:  500.0 µA
```

4. Press ⇳ until `more` blinks, and press Enter.

LA001134

```
R:  +0.0000    Ω                          Vout:   0.000 V
Line   Svc   Test   Exit   more           Clmt:  500.0 µA
```

5. Press ⇳ until `Line` blinks, and press Enter.

LA001116

```
R:  +0.0000    Ω                          Vout:   0.000 V
LINE FREQ:    50Hz    60Hz                Clmt:  500.0 µA
```

   A blinking item means that it is currently selected.
6. If the setting does not match the power LINE frequency, press ⇳ to toggle the setting between `50Hz` and `60Hz`, then press Enter.
7. Select `Exit` and press Enter to exit this menu.

Note

The power line frequency setting is stored and is not changed after reset or power-off. Once you set it, you do not need to set the line frequency again as long as the same power line frequency is being used.

2

Operating the 4339B

In This Chapter

Basic measurement operations of the 4339B and references are explained.

To Reset 4339B to its Default Settings

1. Press blue Reset to select the reset menu.

LA001127

R: +0.0000 Ω	Vout: 0.000 V
System Reset: No Yes	Clmt: 500.0 μA

2. Press ↕ until `Yes` blinks, and press Enter.

For more information about the default settings, see "Default Settings" later in this chapter.

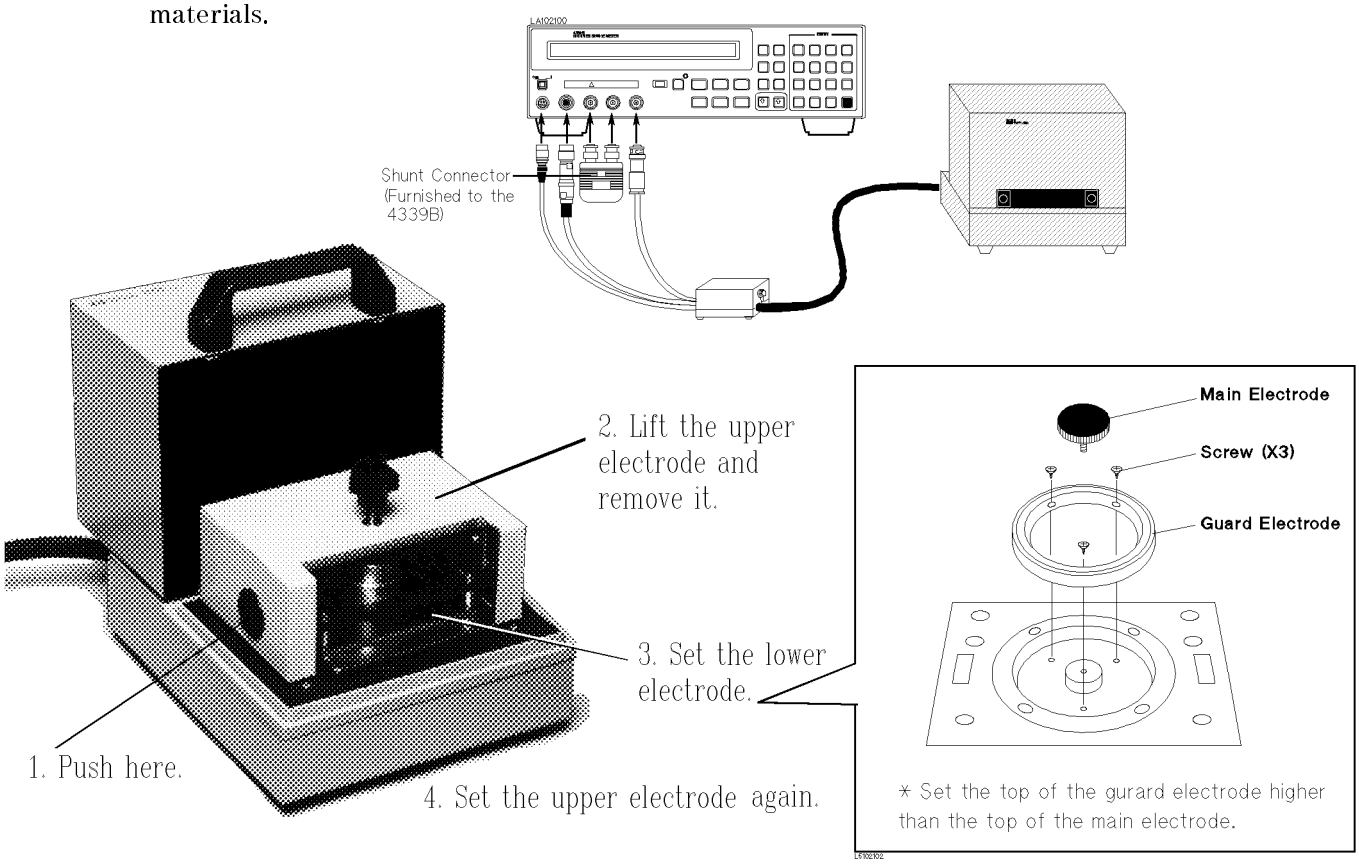
⚠ To Connect Test Fixture

Connect the test fixture to the UNKNOWN terminals as follows:

Warning ⚠ **Do *not* touch the UNKNOWN terminals or the electrodes of the accessory, when the High Voltage indicator is ON, the 4339B outputs dangerous voltage of up to 1000 Vdc. Before handling the 4339B or the accessory, turn OFF the test voltage pressing V Output and confirm that the High Voltage indicator is OFF.**

16008B Resistivity Cell

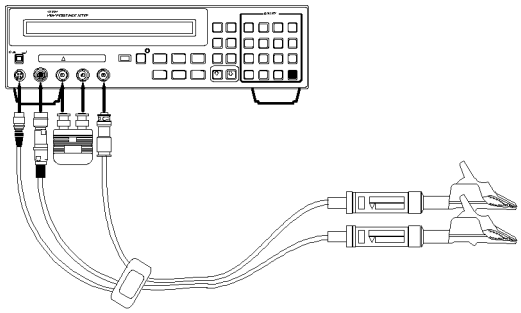
The 16008B is used to measure the volume or surface resistance/resistivity of insulation materials.



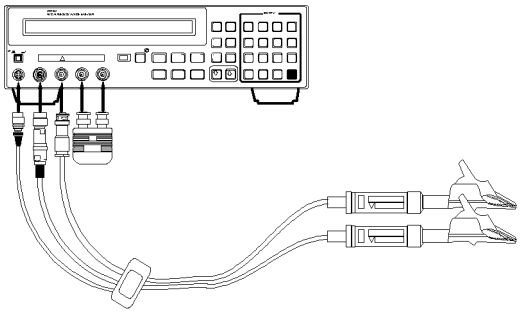
Three size electrodes are available. For detail see "Accessories Available" later in this chapter.

16117B Low Noise Test Lead

The 16117B is used to measure the resistance of insulation materials.



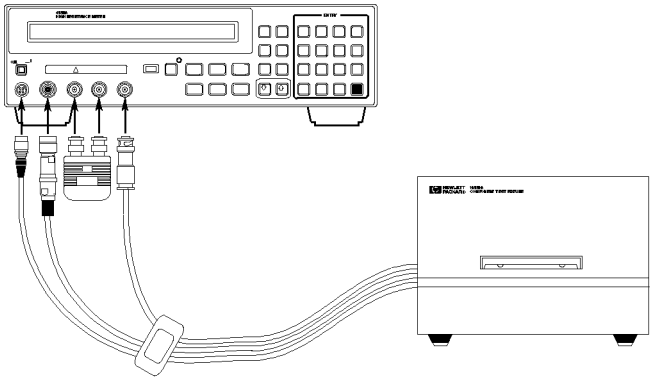
For floating DUT measurement

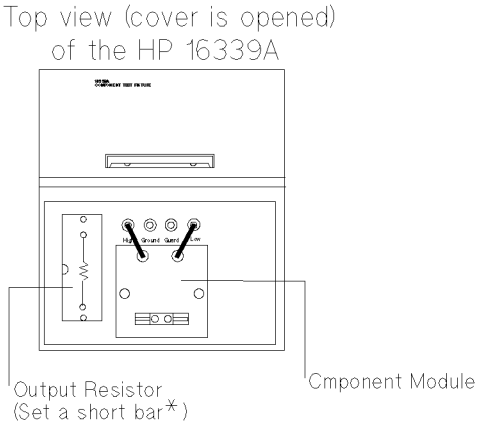


For grounded DUT measurement

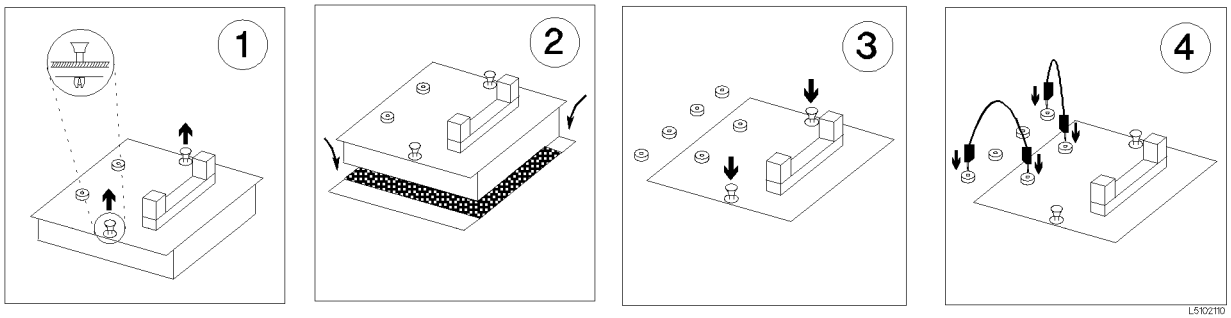
16339A Component Test Fixture

The 16339A is used to measure insulation resistance of electronic components.





To set the component module :



Pull the clamps up. Insert the module. Push the clamps down. conect the banaba cables.

Three type modules are available. For detail see “Accessories Available” later in this chapter.

* Measuring a high capacitance DUT keeping good S/N ratio, change the short bar to an appropriate resistor. For detail, see page 3-6 of *16339A Component Test Fixture Operation and Service Manual*.

To Perform Calibration—Canceling internal measurement errors

1. Press blue Cal (5).

LA001008

```
R:  +0.0000    Ω                    Vout:   0.000 V
ExecCal      Exit                   Clmt:  500.0 µA
```

2. Select `ExecCal` using ◁▷ or ▷◁ and press Enter. The 4339B will perform the calibration. After the calibration is completed with the message `Calibration Complete`, the 4339B will return to the measurement display.

To Set Test Voltage

1. Press Cur Limit (Source Voltage). The voltage setting menu will be displayed.

LA001016

```
R:  +0.0000    Ω                    Vout:   0.000 V
Voltage [V] =     0.0               Clmt:  500.0 µA
```

2. Enter the value using the numeric ENTRY keys (for example, to set 100 V, press Comprtr (1) Comprtr (1) Key Lock (0)), then press Enter.

To Set Current Limit

1. Press blue Cur Limit (Source Voltage).

LA002022

```
R:  +0.0000    Ω                    Vout: 100.0  V
Current Limit [mA] =  0.5           Clmt: 500.0 µA
```

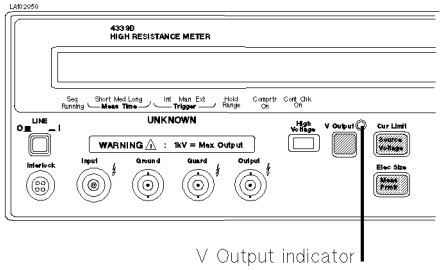
2. Enter the current limit value using the numeric keys, then press Enter to enter the value and to exit.

Available current limits are:

- 0.5 mA (default)
- 1.0 mA
- 2.0 mA (at test voltage 0 to 500 V only)
- 5.0 mA (at test voltage 0 to 250 V only)
- 10 mA (at test voltage 0 to 100 V only)

⚠ To Perform OPEN Correction —Canceling the stray admittance in parallel with the DUT

1. Separate each electrode of the test fixture. For details about fixture operation, refer to "Test Fixtures and Test Leads" later in this chapter.
2. Press V Output. A source voltage is applied to the test fixture, and the **V Output** indicator will turn ON.



Warning ⚠ **Pressing V Output may cause the 4339B to output dangerous voltage, up to 1000 Vdc. Do *not* touch the UNKNOWN terminals or the electrodes of the accessory when the V Output indicator is ON.**

3. Press blue, Open (4). The OPEN correction menu will be displayed.

4. Select `OpenMeas` using ◁▷ or ▷◁ and press Enter. The 4339B will perform the OPEN correction.

   After a while, the 4339B will display the message `Correction Complete`, and return to the measurement mode.
5. Press V Output to turn the voltage OFF. The **V Output** indicator will turns OFF.

If "Out Of Limit" is displayed

The OPEN admittance is so high that it would be unsuitable for OPEN correction data.

□ Check that the test electrodes are properly opened.

Perform the OPEN correction again.

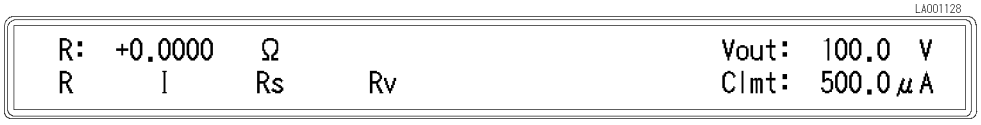
To Connect DUT

Set the DUT to the test fixture. For details, see "Test Fixtures and Test Leads".

Warning **Do *not* touch the UNKNOWN terminals or the electrodes of the accessory, when the High Voltage indicator is ON, the 4339B outputs dangerous voltage of up to 1000 Vdc. Before handling the 4339B or the accessory, turn OFF the test voltage pressing** V Output **and confirm that the High Voltage indicator is OFF.**

To Select Measurement Parameter

1. Press Elec Size / Meas Prmtr . The measurement parameter selection menu will be displayed.



2. Select the desired parameter using ⇩ or ⇧ and press Enter . (R:Resistance, I:Current, Rv:Volume resistivity ρv, Rs:Surface resistivity ρs)

Note If the 16008B resistivity cell is connected to the 4339B, to change volume and surface resistivity, switch the volume/surface selector on the resistivity cell.

Setting the Parameters for Resistivity Measurement

If you measure the volume or surface resistivity, set the parameters as follows:

Press [blue] [Elec Size / Meas Prmtr] .

LA002006

```
R:  +0.0000    Ω                          Vout:   0.000 V
Thickness      Rescell      Exit          Clmt:  500.0 µA
```

Setting Thickness of the DUT

1. Select `Thickness` using [▷] or [◁] and press [Enter] .

LA002007

```
R:  +0.0000    Ω                          Vout:   0.000 V
Thickness [mm] = 2.0000                   Clmt:  500.0 µA
```

2. Enter the thickness value using the numeric ENTRY keys, and press [Enter] .

LA002006

```
R:  +0.0000    Ω                          Vout:   0.000 V
Thickness      Rescell      Exit          Clmt:  500.0 µA
```

Setting the Electrode Size

1. Select `ResCell` using [▷] or [◁] and press [Enter] .

LA002008

```
R:  +0.0000    Ω                          Vout:   0.000 V
26     50      76      User      Exit      Clmt:  500.0 µA
```

2. Select the electrode size that you want to use (`26mm`, `50mm`, or `76mm`) using [▷] or [◁] , and press [Enter] .

LA002009

```
R:  +0.0000    Ω                          Vout:   0.000 V
D: 50mm - 70mm          B = 0.0000        Clmt:  500.0 µA
```

3. Press [Enter]

LA002006

```
R:  +0.0000    Ω                          Vout:   0.000 V
Thickness      Rescell      Exit          Clmt:  500.0 µA
```

4. Select `Exit` and press [Enter] to exit the menu.

To Select Measurement Range

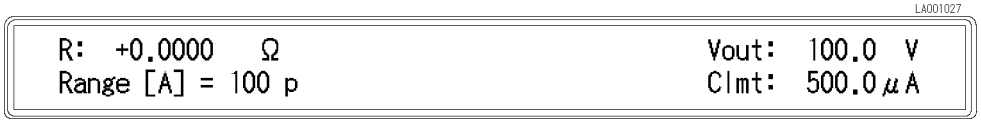
Auto Range mode —Automatically selecting the optimum measurement range

Press Range Setup [Auto Hold] . The **Hold Range** annunciator(▼) turns OFF.

Hold Range mode—Holding the measurement range of your choice

To select the measurement range,

1. Press [blue] Range Setup [Auto Hold] . The measurement range setup menu is displayed.



2. Press [▲] or [▼] until the desired range is displayed. Or, input the current value to be measured using the numeric ENTRY keys, and the 4339B will select the optimum measurement range setting.
3. Press Enter [■] . The **Hold Range** annunciator(▼) turns ON.

Available measurement ranges:

100 pA (Not available at measurement time Short)
1 nA
10 nA
100 nA
1 μA
10 μA
100 μA (Available at measurement time Short only)

To Select Measurement Time Mode

Press Average [Meas Time] until the **Meas Time** annunciator(▼) points to the desired measurement time mode : **Short**, **Med**(Medium) or **Long**.

To Set Averaging Rate—Stabilizing the measurement result

1. Press blue Average (Meas Time) .

LA001118

```
R:  +0.0000    Ω                    Vout:   0.000 V
Average = 1                         Clmt:  500.0 µA
```

2. Enter the averaging rate using the numeric ENTRY keys. (For example, to enter 4, press Open 4 .) You can enter integer values from 1 to 256. Also, you can increase or decrease the value using ↓ or ↑ .
3. Press Enter to set the value and to exit.

To Select Trigger Mode

Press Delay (Trig Mode) until the **Trigger** annunciator(▼) points to the desired trigger mode.

Int(Internal) Free running measurement

Man(Manual) Triggers a measurement when Seq Abort (Trig) is pressed.

Ext(External) Triggers a measurement by external trigger signal input (through the external trigger connector or handler interface).

To trigger a measurement in each mode, see "To Trigger a Measurement" later in this chapter.

To Set Trigger Delay Time

1. Press blue Delay (Trig Mode) .

LA002107

```
R:  +0.0000    Ω                    Vout:   0.000 V
Delay Time [s] = 0.000              Clmt:  500.0 µA
```

2. Enter the desired trigger delay time using the numeric ENTRY keys. (For example, to set 0.5 s, press Key Lock 0 Reset . Cal 5 .) You can set the trigger delay time from 0 s to 9.999 s.
3. Press Enter to set the value and to exit.

To Use Deviation Measurement Function

Setting the Deviation Reference Values

1. Press blue ΔMode 6 .

LA002116

```
R:  +0.0000     Ω                          Vout:  100.0  V
ModeSet      ΔRefEnt      Exit             Clmt:  500.0 μA
```

2. Select ΔRefEnt using ◁▷ or ◁▷ and press Enter .

LA002016

```
R:  +0.0000     Ω                          Vout:  100.0  V
ΔReference = +0.0000                       Clmt:  500.0 μA
```

3. Enter the numeric value using the numeric ENTRY keys.
4. Press Enter to enter the value.

Selecting the Deviation Mode

5. Select ModeSet using ◁▷ or ◁▷ and press Enter .

LA002117

```
R:  +0.0000     Ω                          Vout: 100.0  V
Off    ΔABS    Δ%                          Clmt: 500.0 μA
```

6. Select the desired mode using ◁▷ or ◁▷ and press Enter .

ΔABS mode: Measured value−Reference

LA002017

```
ΔR:  +0.0000     Ω                         Vout: 100.0  V
                                           Clmt: 500.0 μA
```

Δ% mode: (Measured value−Reference)/Reference × 100 %

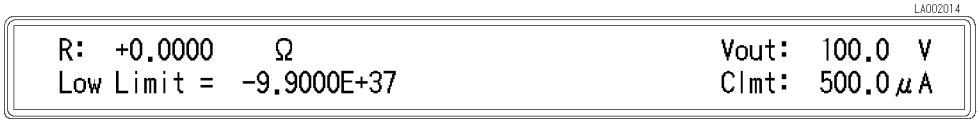
LA002028

```
ΔR:  +9.9E+37 %                            Vout: 100.0  V
                                           Clmt: 500.0 μA
```

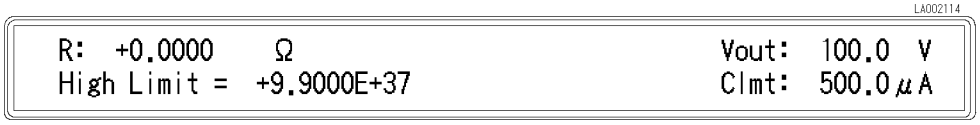
To Use Comparator Function

Setting the Limit Values

1. Press [Low Limit]



2. Enter the lower limit value using the numeric ENTRY keys, then press [Enter] to enter the value. You can set the value from -9.900×10^{37} to 9.900×10^{37}.
3. Press [High Limit] .



4. Enter the upper limit value using the numeric ENTRY keys, then press [Enter] to enter the value and to exit. You can set the value from -9.900×10^{37} to 9.900×10^{37}.

Sorting

To start sorting,

Press [blue] [Comprtr 1] . The **Comprtr On** annunciator(▼) turns ON.

To turn sorting OFF,

Press [blue] [Comprtr 1] again. The **Comprtr On** annunciator turns OFF.

The sorting results are HIGH, IN, and LOW.

Where,

HIGH	greater than higher limit
IN	between higher limit and lower limit
LOW	less than lower limit

The 4339B shows the comparison results using the display, beeper, printer, and 16064B LED Display/Trigger Box. (To use the 16064B, see "Accessories Available" later in this chapter.)

- For result output to the display, see "To Select Display Mode" in the next page.
- For result output to the beeper, see "To Select Beeper Mode" in the next page.
- For result output to the printer, see "To Print Measurement Data" later in this chapter.

To Select Display Mode

Press blue Disp Mode 3 .

LA002115

```
R:  +0.0000    Ω                          Vout:  100.0  V
Off     Data     Comprtr     Formt         Clmt:  500.0 µA
```

Select the desired mode using ◁ or ▷ and press Enter .

(`Data`:Measurement Display, `Comprtr`:Comparison Display, `Off`:Display OFF)

If you select `Formt`, the following menu will be displayed. You can select the display digits and display format of the Measurement Display mode.

LA002301

```
R:  +0.0000    Ω                          Vout: 100.0  V
Digit    R-Unit    Exit                   Clmt: 500.0 µA
```

To select the display digits, select `Digit` and press Enter . Then select the display digits from 3, 4 or 5.

To selet the display format for the measurement data, select `R-Unit` and press Enter . Then select `Exponent` mode or `Prefix` mode.

Each display mode shows the result as follows:

- The Measurement Display mode shows the measurement data:

  `Exponent` mode

LA002304

```
R:  +1.2345E+09 Ω                       Vout: 100.0  V
                                        Clmt: 500.0 µA
```

  `Prefix` mode

LA002305

```
R:  +1.2345  GΩ                         Vout: 100.0  V
                                        Clmt: 500.0 µA
```

- The Comparison Display mode shows the comparison results:

LA002015

```
 Comp[R]: IN                            Vout:  100.0  V
                                        Clmt:  500.0 µA
```

- The Display OFF mode (`DISP OFF`) does not show any measurement result.

To Select Beeper Mode

To change the beeper mode for the comparator result reporting:

1. Press blue Config (−).

LA001034

```
R:  +0.0000    Ω                          Vout:   0.000 V
Offset  Beep   Exit    more                Clmt:  500.0 µA
```

2. Select `Beep` using ⇦ or ⇨ and press Enter to select.

LC002008

```
R:  +0.0000    Ω                          Vout: 100.0  V
Beep:    Off      Fail      Pass           Clmt: 500.0 µA
```

3. Select the beep mode using ⇦ or ⇨, and press Enter to exit to the previous display.

`OFF`	No beep
`FAIL`	Emits a beep when the comparator result is HIGH, LOW, or the contact check FAILed.
`PASS`	Emits a beep when the comparator result is IN.

4. Select `Exit` using ⇦ or ⇨, and press Enter to exit.

To Use Contact Check Function —Monitoring the connection of test electrodes and DUT

To enable or disable the contact check function:

1. Press blue Cont Chk (2).

LA102001

```
R:  +0.0000    Ω                          Vout:   0.000 V
ON/OFF  OfsEnt   Exit    more              Clmt:  500.0 µA
```

2. Select `ON/OFF` using ⇦ or ⇨ and press Enter to select.

LA102002

```
R:  +0.0000    Ω                          Vout:   0.000 V
Contact Check:    Off     On               Clmt:  500.0 µA
```

3. Select `On` or `Off` using ⇦ or ⇨, and press Enter to exit to the previous display.

4. Select `Exit` using ⇦ or ⇨, and press Enter to exit.

5. The **Cont Chk** annunciator(▼) turns ON if the contact check function is on.

When contact check failed, the 4339B displays `N.C.`(No-Contact). The limit value for the contact check function is changable. Refer to *Operation Manual*.

The OPEN correction function must be performed correctly for a valid contact check.

To Print Measurement Data

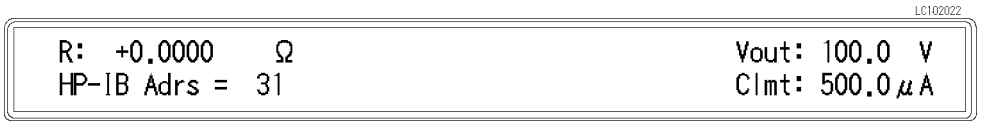
Setting the Printer

1. Use an GPIB compatible printer, set to the listen-always mode.
2. Connect the printer to the 4339B's GPIB port on the rear panel.
3. Turn the printer ON.

Printing

Set the 4339B to talk only mode (Set the 4339B's GPIB address to 31).

1. Press blue, Adrs (Lcl), Disp Mode (3), Comprtr (1).



2. Press Enter. The **Talk Only** annunciator(▼) turns ON, and the printer begins printing the measurement data.

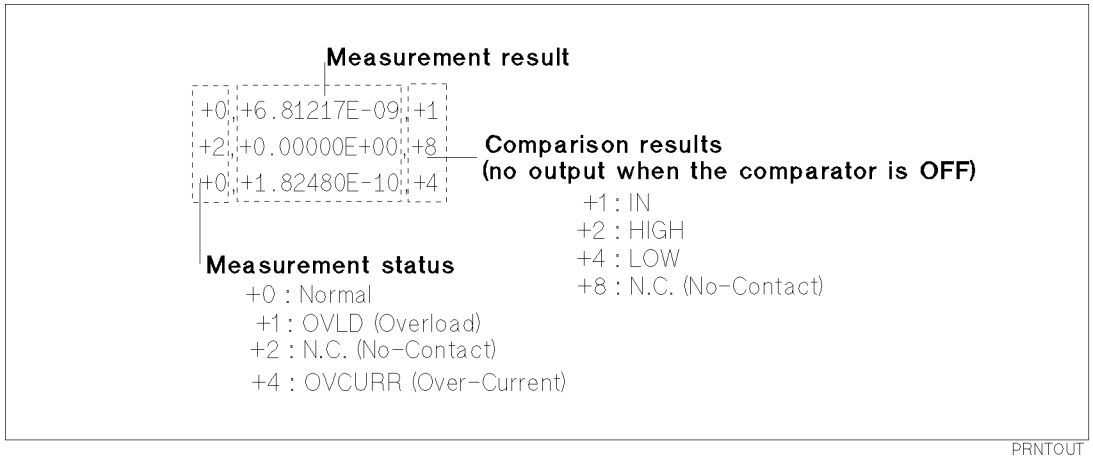


Figure 2-1. Printer Output

Disabling Printing

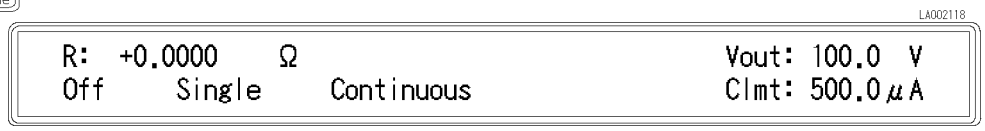
Change the GPIB address to an address other than 31 (for example, 17, which is the default setting).

Press blue, Adrs (Lcl), Comprtr (1), Min (7), Enter.

To Use Measurement Sequence Function —Controlling charge-measurement in a sequence

Selecting the Measurement Sequence Mode

Press Program Seq Mode .

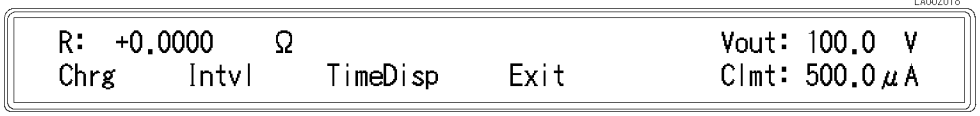


Select the desired mode using ◁ or ▷ and press Enter .

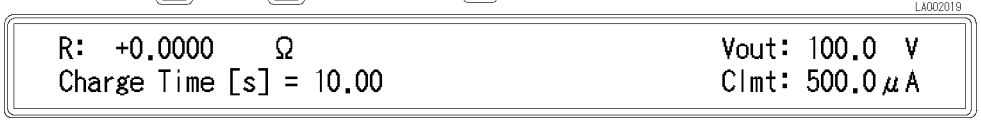
`Single`	Single mode
`Continuous`	Continuous mode
`Off`	Measurement sequence OFF (normal measurement mode)

Setting the Measurement Sequence

1. Press blue Program Seq Mode . The sequence mode menu will be displayed.

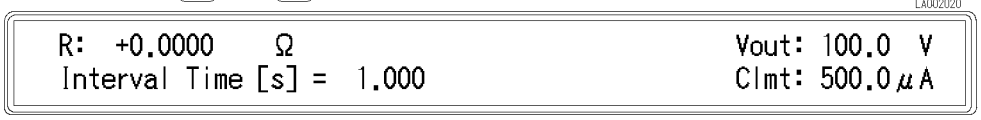


2. Set Charge time.
   a. Select `Chrg` using ◁ or ▷ and press Enter .

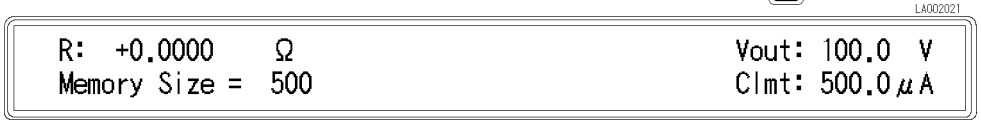


   b. Enter the charge time using the numeric ENTRY keys, and press Enter .

3. Set Interval time and Number of repetitions (**Cont** mode only).
   a. Select `Intvl` using ◁ or ▷ and press Enter .



   b. Enter the interval time using the numeric ENTRY keys, and press Enter .



   c. Enter the number of measurement points (equivalent to Memory size), and press Enter .

4. Select `Exit` and press Enter to exit.

Starting Measurement Sequence

Press Seq Abort / Trig. The **Seq Running** annunciator(▼) turns ON.

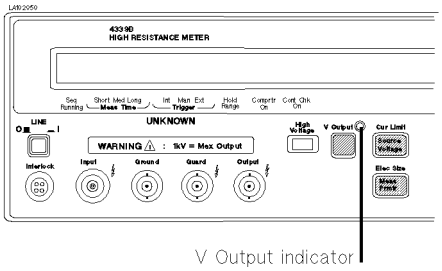
Warning **Pressing Seq Abort / Trig may cause the 4339B to output dangerous voltage, up to 1000 Vdc. Do *not* touch the UNKNOWN terminals or the electrodes of the accessory, when the V output indicator is ON.**

Aborting Measurement Sequence

Press blue, Seq Abort / Trig. The **Seq Running** annunciator(▼) turns OFF.

To Apply Test Voltage

Press V Output. The **V Output** indicator turns ON.



Warning **Pressing V Output may output dangerous voltage, up to 1000 Vdc. Do *not* touch the UNKNOWN terminals or the electrodes of the accessory when the V Output indicator is ON.**

To Trigger a Measurement

- In internal trigger mode—The 4339B makes continuous free-running measurements.
- In manual trigger mode—Press Seq Abort / Trig when you want to trigger a measurement.
- In external trigger mode— Connect the external trigger source to the EXT TRIGGER terminal on the 4339B's rear panel, and apply a TTL level trigger signal to trigger a measurement. (For details, see the *4339B Operation Manual.*)
  Note that the 4339B must be set to the external trigger mode to be triggered from an external handler or from the 16064B LED Display/Trigger Box.

To Turn OFF Voltage Output

Press V Output and confirm the **V Output** indicator and the **High Voltage** indicator is turn OFF.

Warning **If the High Voltage Indicator turns ON after turning OFF the test voltage, the DUT is still charged. This happens especially for capacitive DUTs. Do *NOT* handle the DUT while the High Voltage Indicator is turned ON. When the charge on the DUT discharges to a safe level(less than 42 V) the High Voltage indicator will turn OFF.**

Reference

Default Settings

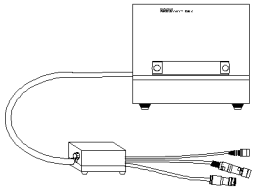
- Test voltage output : OFF
- Test voltage : 0 V
- Current limit : 0.5 mA
- Measurement parameter : R
- Resistivity cell D1 : 50 mm
  D2 : 70 mm
  t : 2 mm
  B : 0
- Deviation measurement : OFF
- Measurement range : Auto
- Measurement time : MEDium
- Averaging rate : 1
- Trigger mode : Internal
- Trigger delay time : 0 ms
- Comparator : OFF
- Contact check : OFF
- Display mode : Measurement mode
- Beep mode : `FAIL` mode
- Offset-error canceling : OFF
- OPEN correction data is cleared

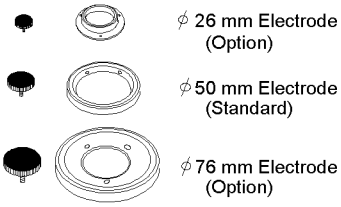
Accessories Available

Test Fixtures and Test Leads

Following test fixtures and test leads are available for the 4339B for various forms of DUTs.

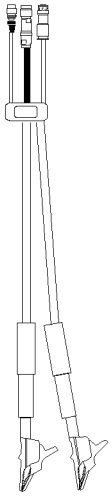
16008B Resistivity Cell



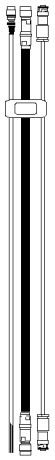


Option 001: Add both 26 mm and 76mm electrodes
Option 002: Add 26 mm electrode
Option 003: Add 76 mm electrode

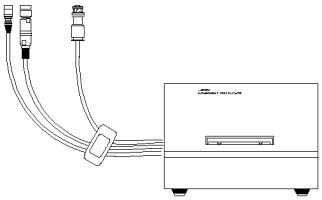
16117B Low Noise Test Leads

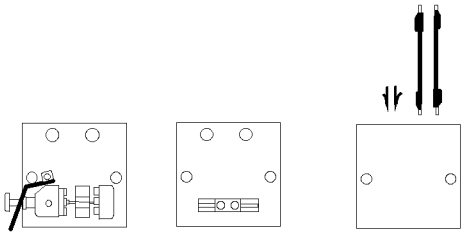


16117C Low Noise Test Leads

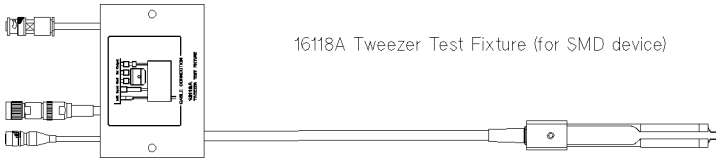


16339A Component Test Fixture

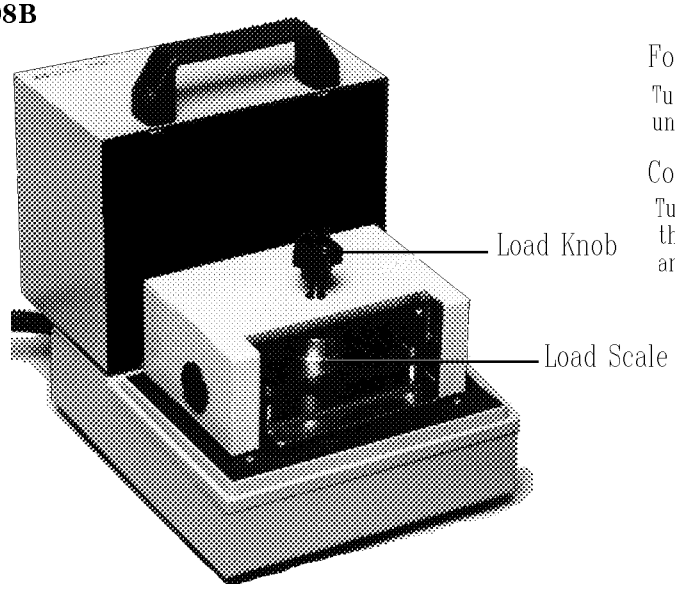




SMD Module | Axial Lead Module | Alligator Clip and Flat Table



16008B



For an OPEN correction

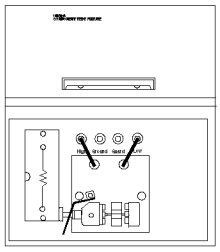
Turn the load knob counterclockwise until the upper electrode does not move.

Connecting the DUT

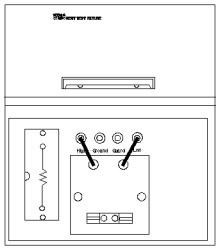
Turn the load knob clockwise until the load scale indicates between 0 kg and 10 kg.

16339A

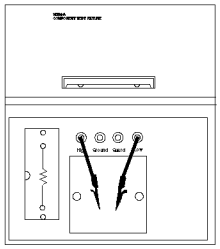
SMD module



Axial Lead module

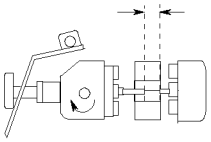


Alligator clip and Flat table



For an OPEN correction

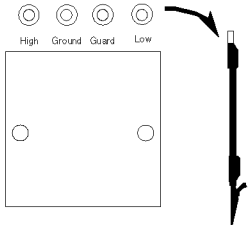
same as the DUT's width



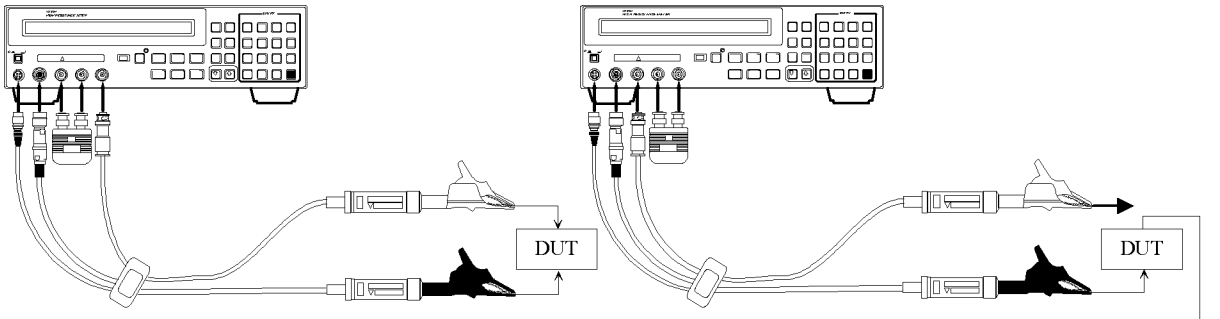
Tighten the screw to hold the electrode.

Nothing must be connected to electrode.

Remove the alligator clips.



16117B

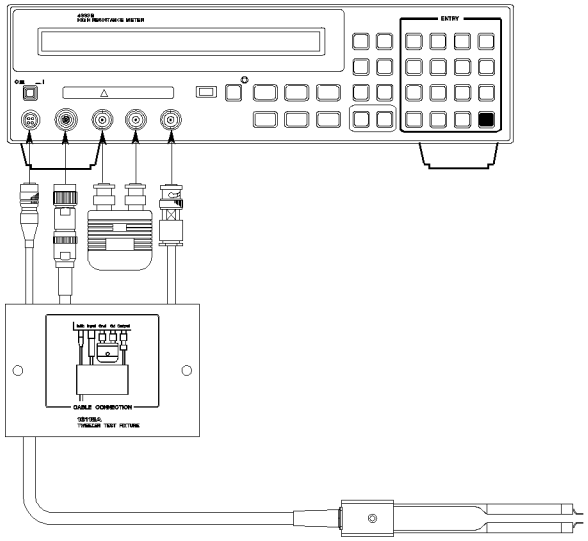


Floating DUT measurement

For grounded DUT measurement

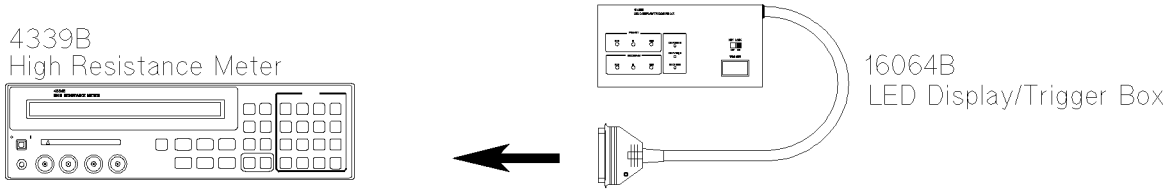
4339B

16118A



16064B LED Display/Trigger Box

The 16064B LED Display/Trigger Box triggers a measurement when its trigger key is pressed, and displays the comparison results using LEDs. It allows you to manually operate the comparator function of the 4339B.



Connect to the Handler Interface connecter on the rear panel.

Other Topics

For details on these functions, see the *4339B Operation Manual*.

- Initial Inspection — Chapter 1 of the *Operation Manual*
- Auto-Offset Canceling — Chapter 2 and Chapter 3 of the *Operation Manual*
- Key Lock Function — Chapter 2 and Chapter 3 of the *Operation Manual*
- GPIB — Chapter 4 and Chapter 5 of the *Operation Manual*
- Handler Interface — Chapter 3 and Appendix B of the *Operation Manual*
- Save / Recall — Chapter 2 and Chapter 3 of the *Operation Manual*
- Backup Function — Chapter 3 of the *Operation Manual*
- Specification — Chapter 8 of the *Operation Manual*
- Maintenance — Chapter 9 of the *Operation Manual*
- Error Messages — "Error Messages" in back of the *Operation Manual*

If You Have a Problem

If any of the problems listed below occur, follow the instructions given for the problem.

- If you find yourself lost when operating the 4339B

  You can get back on track by:

  To return to the measurement mode Press Enter several times. When `Exit` is in the menu, select it and press Enter.

  To return to the default settings Press blue Reset (.). Select `Yes` and press Enter. If the reset is not accepted, confirm that the **Key Lock** annunciator(▼) is turned ON. See next.

- If the 4339B does not accept key input:
  - Check whether or not the **Key Lock** annunciator(▼) is ON. If so:
    - Press blue Key Lock (0). The **Key Lock** annunciator(▼) turns OFF and the front-panel keys are unlocked.
    - Check that the 16064B LED display/trigger box is connected to the 4339B and it is set to lock out the keys. If so, unlock the keys from the 16064B.
- If V Output is not accepted:
  - Check whether the interlock connector is firmly connected.
  - If you are using the 16008B or the 16339A,
    - Check whether the top cover of the test fixture is closed.
- If `------` or "OVLD" is displayed:

  The measurement result is out of the measurable range. Check the DUT and make sure the measurement range is properly set.

3

Measurement Examples

In This Chapter

The 4339B's features are discussed, which you can investigate by trying the typical measurement examples described in this chapter.

Warning **Do *not* touch the UNKNOWN terminals or the electrodes of the accessory, when the High Voltage indicator is ON, the 4339B outputs dangerous voltage of up to 1000 Vdc. Before handling the 4339B or the accessory, turn OFF the test voltage pressing**

and confirm that the High Voltage indicator is OFF.

Measuring Insulation Resistance of Capacitor

This example shows the procedure to measure insulation resistance of capacitor after charged 1 minute. Using the test sequence measurement function reduces the measurement complexity.

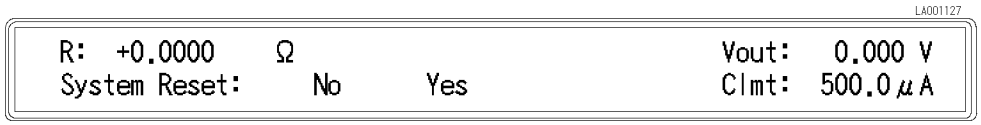
DUT	Requirements
Chip ceramic capacitor	Test Fixture : 16339A, SMD module

Measurement Setup

Measurement Parameter : R
Measurement Range : Auto range mode
Test Voltage : 100 V
Use the measurement sequence single mode (measure after charged for 1 minute.)

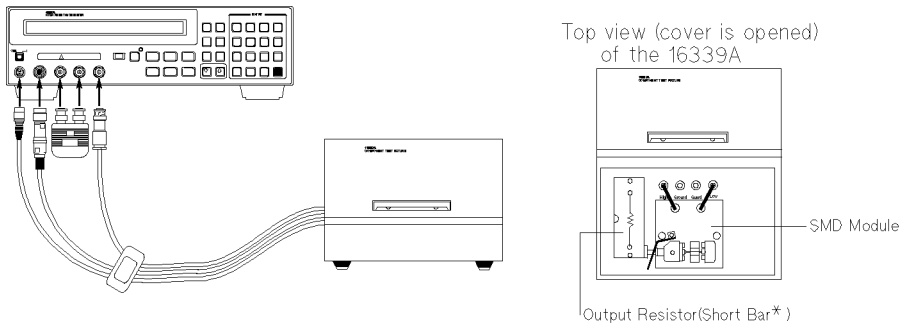
Measurement Procedure

1. Reset the 4339B.
   a. Press blue Reset .

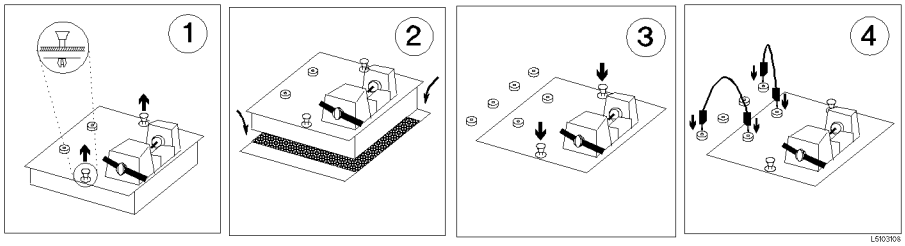


   b. Select Yes using ↓ or ↑ and press Enter .

2. Connect the test fixture to the UNKNOWN terminals as follows:



To set the SMD module :



   * For detail, see “16339A Component Test Fixture” in Chapter 2.

3. Perform calibration.
   Press blue Cal 5 .

LA001008

```
R:  +0.0000    Ω                    Vout:   0.000 V
ExecCal     Exit                    Clmt:  500.0 µA
```

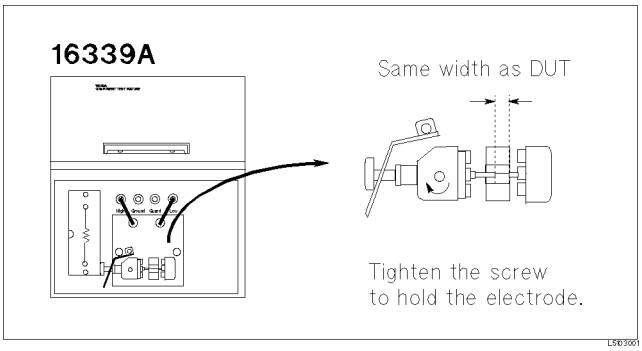
Select `ExecCal` using ⇦ or ⇨ and press Enter. After a while, the calibration will be completed with the message "`Calibration Complete`".

4. Set the test voltage.
   a. Press Cur Limit / Source Voltage.

LA001016

```
R:  +0.0000    Ω                    Vout:   0.000 V
Voltage [V] =     0.0               Clmt:  500.0 µA
```

   b. Press Comprtr (1), Key Lock (0), Key Lock (0), Enter to set the test voltage to 100 V.
5. Perform the OPEN correction.
   a. Separate the test electrodes and fix them (nothing must be connected to the electrodes).

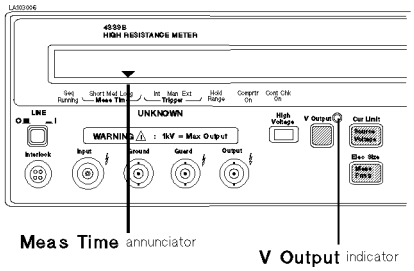


   b. Close the cover.
   c. Press Elec Size / Meas Prmtr.

LA001128

```
R:  +0.0000    Ω                    Vout:  100.0  V
R      I       Rs       Rv          Clmt:  500.0 µA
```

   d. Select `I` using ⇦ or ⇨ and press Enter to select the current measurement mode. displayed.
   e. Press Average / Meas Time. The **Meas Time** annunciator(▼) will indicate **Long**.
   f. Press V Output to turn ON the test voltage.
      The **V Output** indicator will turn ON.
   g. Wait until the `I` value has stabilized within 0.5 pA.



h. Press blue, Open (4).

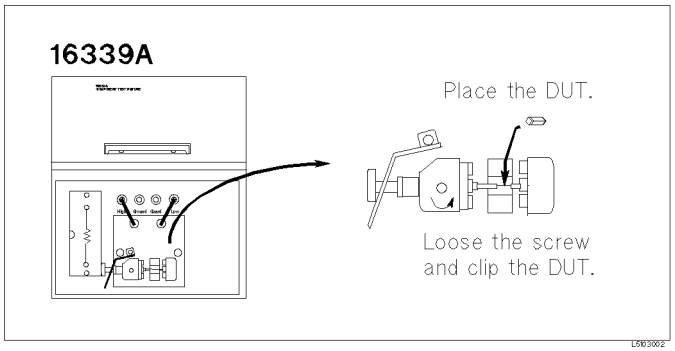
LA103010

```
I:  +0.12  pA                                  Vout:  100.0  V
OpenMeas     MeasVal     Exit                  Clmt:  500.0 µA
```

i. Select `OpenMeas` using ◁ or ▷ and press Enter.
After a while, the OPEN correction will be completed with the message "`Correction Complete`". (If `Out Of Limit` is displayed, see "⚠ To Perform OPEN Correction —Canceling the stray admittance in parallel with the DUT" in Chapter 2.)

j. Press V Output to turn OFF the test voltage. The **V Output** indicator will turn OFF.

6. Connect the DUT and close the cover.



7. Press Elec Size, Meas Prmtr.

LA103128

```
I:  +0.12  pA                                  Vout:  100.0  V
R      I       Rs       Rv                     Clmt:  500.0 µA
```

8. Select `R` using ◁ or ▷ and press Enter to select the resistance measurement mode. R(Resistance).
9. Set the measurement sequence charging time to 1 minute.
   a. Press blue, Program, Seq Mode.

LA002018

```
R:  +0.0000     Ω                              Vout: 100.0  V
Chrg     Intvl     TimeDisp     Exit           Clmt: 500.0 µA
```

   b. Select `Chrg` using ◁ or ▷ and press Enter.

LA002019

```
R:  +0.0000     Ω                              Vout: 100.0  V
Charge Time [s] = 10.00                        Clmt: 500.0 µA
```

   c. Press △Mode (6), Key Lock (0), Enter.

   d. Select `Exit` and press Enter to exit.

e. Press Program Seq Mode .

LA002118

```
R:  +0.0000    Ω                          Vout: 100.0  V
Off     Single     Continuous             Clmt: 500.0 μA
```

f. Select `Single` using ◁ or ▷ and press Enter .

10. Press Seq Abort Trig . After charging 1 minute, the measuremen result will be displayed. The following figure shows the typical measurement result display.

LA103107

```
R:  +3.5479E+10 Ω                        Vout:  100.0  V
                                         Clmt:  500.0 μA
```

For More Information

- To print out the measurement result — See "To Print Measurement Data" in Chapter 2
- To select measurement level — See "To Set Test Voltage" in Chapter 2

Measuring Resistivity of Insulation Material

This example shows the procedure to measure resistivity of an insulation material after charged 1 minute. The 16008B Resistivity Cell is a right tool to measure resistivity of solid insulation materials.

DUT

Insulation Material
(5 mm × 120 mm × 120 mm)

Requirements

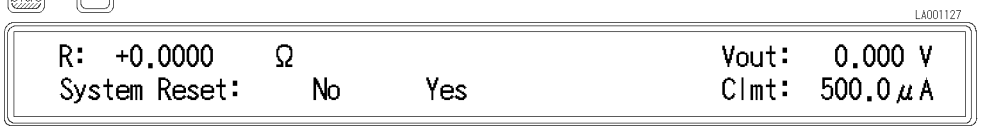
Test Fixture : 16008B, ϕ 50 mm electrode

Measurement Setup

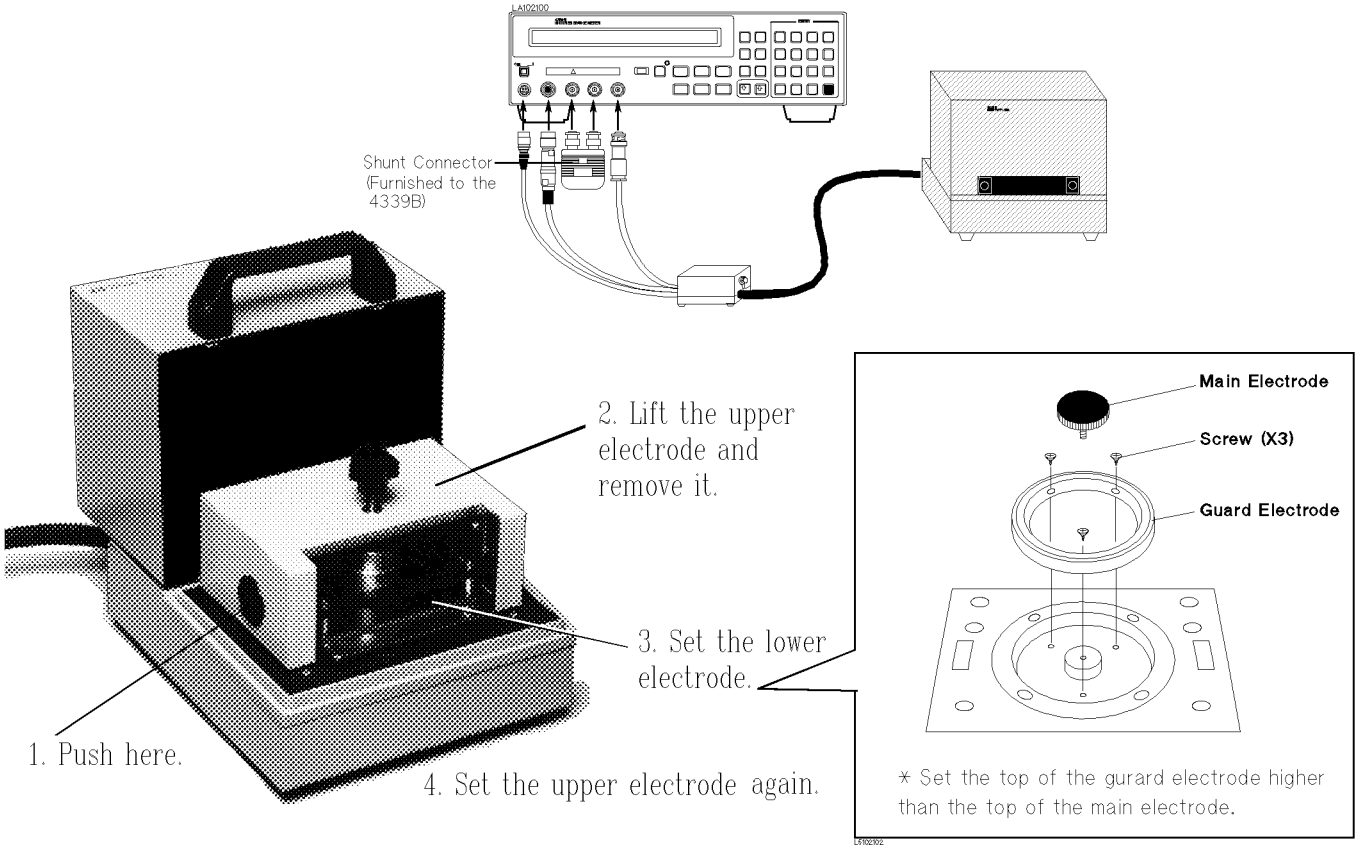
Measurement parameter : Rv(ρv)
Measurement Range : Auto range mode
Test Voltage : 500 V
Use the measurement sequence single mode (measure after charged for 1 minute.)

Measurement Procedure

1. Reset the 4339B.
   a. Press blue Reset .



   b. Select Yes using ↑ or ↓ and press Enter .
2. Connect the test fixture to the UNKNOWN terminals as follows:



3. Perform calibration.
   a. Press blue Cal 5 .

LA001008

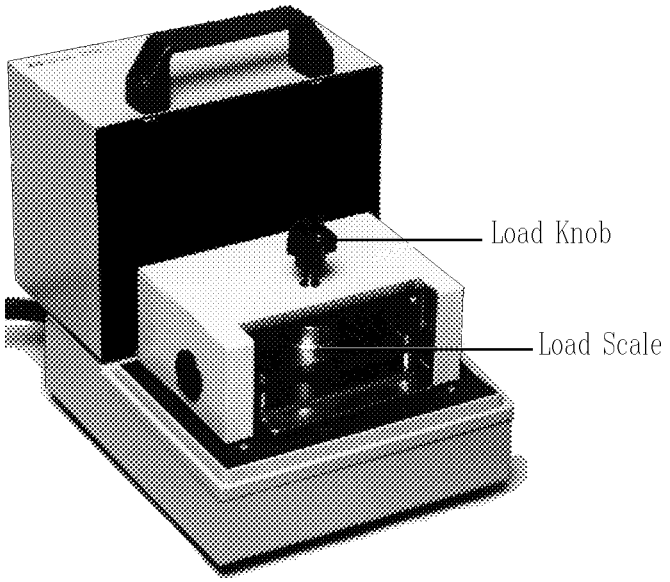
R: +0.0000 Ω	Vout: 0.000 V
ExecCal Exit	Clmt: 500.0 μA

   b. Select `ExecCal` using ◁ or ▷ and press Enter .
   After a while, the calibration is completed with the message "`Calibration Complete`".
4. Set the test voltage.
   a. Press Cur Limit Source Voltage .

LA001016

R: +0.0000 Ω	Vout: 0.000 V
Voltage [V] = 0.0	Clmt: 500.0 μA

   b. Press Cal 5 Key Lock 0 Key Lock 0 Enter to set the test voltage to 500 V.
5. Perform the OPEN correction.
   a. Turn the load knob counterclockwise(ccw) until the upper electrode does not move.



   b. Close the cover.
   c. Press Elec Size Meas Prmtr .

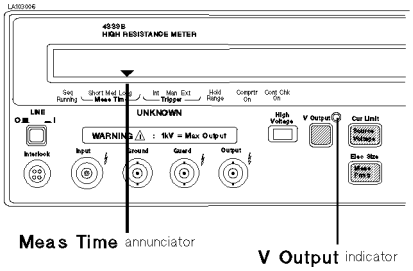
LA103100

R: +0.0000 Ω	Vout: 500.0 V
R I Rv	Clmt: 500.0 μA

d. Select I using ◁ or ▷ and press Enter to select the current measurement mode.

e. Press Average Meas Time . The **Meas Time** annunciator(▼) will indicates **Long**.

f. Press V Output . The **V Output** indicator will turn ON.



g. Wait until the I value has stabilized within 0.5 pA.

h. Press blue Open 4 .

LA103110

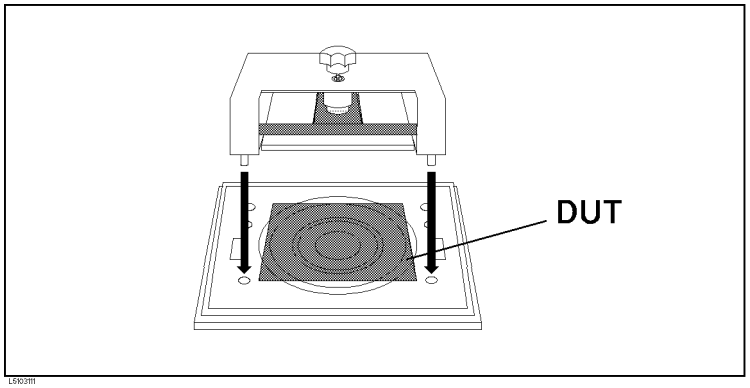
I: +0.12 pA	Vout: 500.0 V
OpenMeas MeasVal Exit	Clmt: 500.0 μA

i. Select OpenMeas using ◁ or ▷ and press Enter .
After a while, the OPEN correction is completed with the message "Correction Complete". (If Out Of Limit is displayed, see "⚠ To Perform OPEN Correction —Canceling the stray admittance in parallel with the DUT" in Chapter 2.)

j. Press V Output . The **V Output** indicator will turn OFF.

6. Set the DUT.

a. Place the DUT on the Main electrode.



b. Turn the load knob and stick the electrode on the DUT.(Let the load scale indicate more than 0 kg and less than 10 kg.)

c. Close the cover.

7. Set the measurement parameter to Rv(ρv : volume resistivity).

a. Turn the Volume/Surface selector of the 16008B to "Volume".

b. Press Elec Size Meas Prmtr .

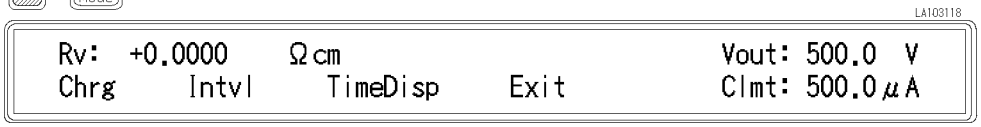
LA103228

I: +0.12 pA	Vout: 500.0 V
R I Rv	Clmt: 500.0 μA

c. Select Rv using ◁ or ▷ and press Enter .

8. Set the measurement sequence charging time to 1 minute.

   a. Press blue, Program Seq Mode.

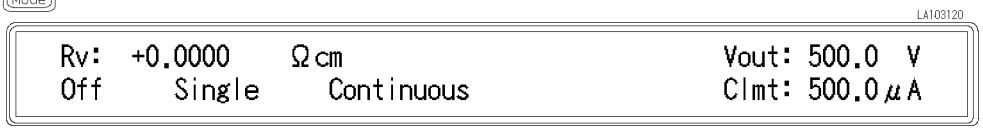


   b. Select `Chrg` and press Enter.

   c. Press △Mode 6, Key Lock 0, Enter.

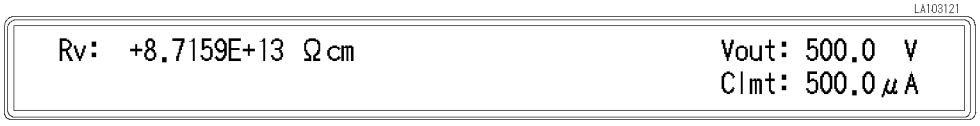
   d. Select `Exit` and press Enter to exit.

   e. Press Program Seq Mode.



   f. Select `Single` using ◁ or ▷ and press Enter.

9. Press Seq Abort Trig. After charging 1 minute, the measurement result will be displayed. The following figure shows the typical measurement result display.



For More Information

- To print out the measurement result — See "To Print Measurement Data" in Chapter 2
- To select other measurement parameters — See "To Select Measurement Parameter" in Chapter 2
- To select measurement level — See "To Set Test Voltage" in Chapter 2